

## Masseteric-Facial Anastomosis for Dynamic Lower Eyelid Reanimation in Facial Paralysis

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Garrett R. Griffin and Babak Azizzadeh

Complete facial nerve paralysis has a significant impact on the appearance and function of the eye and eyelids. At rest, loss of resting orbicularis tone leads to lower lid retraction and eventually ectropion. Patients develop paralytic lagophthalmos which is made worse by their lower lid malposition. In combination, these factors create significant dry eye symptoms at minimum, with the potential for exposure keratitis and vision loss. Equally important are the aesthetic implications. The eyes are the focus of human social interaction, and asymmetries in the shape, color, and movement of the eye and eyelids detract from one's ability to accurately convey one's personality and emotions (Ishii et al. 2011).

Methods of rehabilitating the eye in complete flaccid facial paralysis include static and dynamic techniques. Static techniques, including lower lid-tightening procedures and upper lid weights, can be quite effective at helping to resolve dry eye and lagophthalmos and can significantly improve cosmesis if done well. Dynamic techniques include upper lid springs, muscle transfers, and nerve substitution procedures. Upper lid

springs have a high extrusion and revision rate, and regional and free muscle transfers around the eye can cause asymmetries in periocular volume that are aesthetically unacceptable. In contrast, nerve substitution techniques can be quite powerful in helping to improve both eyelid function and periocular cosmesis. Specifically, by reinnervating the orbicularis oculi muscle, nerve substitution restores resting lower lid tone and can improve eye closure and facial symmetry.

The term nerve substitution refers to the concept that a nerve other than the facial nerve is used to reinnervate the facial musculature, including the orbicularis oculi muscle. Nerve substitution techniques are used when it is not possible to reconstitute a complete circuit between the facial nerve nucleus and facial muscles. More simply put, nerve substitution is used when the proximal facial nerve is injured and cannot be repaired with a nerve graft. This situation is most common following the treatment of skull base tumors such as vestibular schwannoma.

The hypoglossal nerve has traditionally been considered the gold standard donor nerve. Classically the full thickness of the hypoglossal nerve was anastomosed end to end with the distal facial nerve stump. This did restore significant facial tone but also caused tongue hemiparesis and often *too much* reinnervation leading to mass movement. This led to the development of split hypoglossal-facial nerve anastomosis with or without jump grafting, as well as end-to-side hypoglossal-facial anastomosis.

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G.R. Griffin, MD (✉)  
Midwest Facial Plastic Surgery and  
Aesthetic Skin Care, Midwest Eye and Ear Institute,  
Woodbury, MN, USA  
e-mail: [griffin.fpsurgery@gmail.com](mailto:griffin.fpsurgery@gmail.com)

B. Azizzadeh, MD  
Department of Head and Neck Surgery,  
David Geffen School of Medicine @ UCLA,  
Beverly Hills, CA, USA